

## CLAIMS

What is claimed is:

1. A method of identifying an anti-nematode agent, comprising:  
contacting a test compound to a nematode; and  
5 monitoring a female sexual maturation of the nematode, wherein inhibition  
of the female sexual maturation indicates that the test compound includes  
the anti-nematode agent.
2. The method of Claim 1, wherein the female sexual maturation comprises an  
oocyte maturation or a gonadal sheath cell contraction.
- 10 3. The method of Claim 1, wherein the female sexual maturation comprises an  
ovulation.
4. The method of Claim 1, wherein the monitoring step includes optical  
detection.
- 15 5. The method of Claim 1, wherein the monitoring step includes optical  
detection of more than one female sexual maturation episode at the same  
time.
6. The method of Claim 1, wherein the nematode is an animal parasitic  
nematode.
7. The method of Claim 1, wherein the nematode is a plant parasitic nematode.

8. The method of Claim 1, wherein the nematode is of the genus *Caenorhabditis*.
9. The method of Claim 1, wherein the nematode is *Caenorhabditis elegans*.
10. The method of Claim 1, wherein the nematode is of the genus *Ascaris*.
- 5 11. The method of Claim 1, wherein the nematode comprises a roundworm.
12. The method of Claim 1, wherein the nematode comprises a member of a genus selected from a group consisting of: *Ascaris*, *Heterodera*, *Globodera*, *Meloidogyne*, *Ditylenchus*, *Anguina*, *Pratylenchus*, *Radopholus*, *Hirschmanniella*, *Hoplolaimus*, *Rotylenchulus*, *Tylenchulus*, *Helicotylenchus*,  
10 *Criconemella*, *Xiphinema*, *Longidorus*, *Trichodorus*, *Paratrichodorus*, *Aphelenchus*, *Onchocerca*, *Brugia*, and *Wuchereria*.
13. The method of Claim 1, wherein the nematode includes a defect in a production of a sperm.
14. The method of Claim 1, wherein the nematode includes a genetic mutation.
- 15 15. The method of Claim 1, wherein the nematode is selected from a group consisting of: a *fog-1* nematode, a *fog-2* nematode, a *fog-3* nematode, a *fem-1* nematode, a *fem-2* nematode, a *fem-3* nematode, and a *gld-1* nematode.
- 20 16. The method of Claim 1, wherein the nematode comprises a transgenic nematode including a transgenic expression of a major sperm protein, or a biologically active fragment thereof.

17. The method of Claim 1, wherein the nematode comprises a transgenic nematode including an ectopic expression of a major sperm protein, or a biologically active fragment thereof.
18. The method of Claim 1, wherein the nematode comprises a transgenic nematode including a transgenic expression of a major sperm protein from a nematode of a genus *Caenorhabditis* or a genus *Ascaris*, or a biologically active fragment thereof.
19. A method of inhibiting a reproduction of the nematode of Claim 1, comprising: administering the anti-nematode agent identified in Claim 1 to the nematode.
20. The method of claim 19, wherein the anti-nematode agent comprises an antibody that binds specifically to the major sperm protein, or a biologically active fragment thereof.
21. A method of controlling a population of nematodes, comprising: administering the anti-nematode agent identified in Claim 1 to the nematodes.
22. A method of controlling a population of nematodes in an animal in need thereof, comprising: administering the anti-nematode agent identified in Claim 1 to the animal in an amount effective to control the population of nematodes.
23. A method of increasing a host resistance to a nematode infection in an animal in need thereof, comprising: administering the anti-nematode agent

identified in Claim 1 to the animal in an amount effective to increase the host resistance.

5 24. A method of increasing a host resistance to a nematode infection in a non-human animal in need thereof, comprising: expressing the anti-nematode agent identified in Claim 1 in the animal, wherein the agent comprises a polypeptide which binds a major sperm protein.

25. A method of controlling a population of nematodes in a plant in need thereof, comprising: administering the anti-nematode agent identified in Claim 1 to the plant in an amount effective to control the population of nematodes.

10 26. A method of increasing a host resistance to a nematode infection in a plant in need thereof, comprising: administering the anti-nematode agent identified in Claim 1 to the plant in an amount effective to increase the host resistance.

15 27. A method of increasing a host resistance to a nematode infection in an plant in need thereof, comprising: expressing the anti-nematode agent identified in Claim 1 in the plant, wherein the agent comprises a polypeptide which binds a major sperm protein.

28. A process of making a factor that inhibits a female sexual maturation of a nematode, the method comprising:

contacting a test compound to a nematode;

20 monitoring the female sexual maturation, wherein inhibition of the female sexual maturation indicates that the test compound comprises the factor; and manufacturing the factor.

29. A method of identifying an anti-nematode agent, comprising:
- contacting a test compound to a polypeptide comprising a major sperm protein or a portion thereof capable of stimulating a female sexual maturation; and
- 5 detecting a composition including the test compound and the polypeptide, wherein the presence of the composition indicates that the test compound is the anti-nematode agent.
30. The method of Claim 29, further comprising screening the anti-nematode agent for inhibition of a female sexual maturation.
- 10 31. The method of Claim 29, wherein the MSP comprises the amino acid sequence set forth in SEQ ID NO:2: or nematode major sperm protein alignment variants thereof, or a portion thereof capable of stimulating a female sexual maturation.
- 15 32. A method of inhibiting a reproduction of a nematode, comprising: inhibiting a stimulation of a female reproductive cell by a major sperm protein.
33. A method of identifying an agent that binds to a biologically active domain of a nematode major sperm protein, comprising:
- contacting a test compound to the domain; and
- 20 detecting a composition including the test compound and the domain, wherein the presence of the composition indicates that the agent binds to the domain.

34. An isolated nematode major sperm protein domain, comprising: a polypeptide including 125 or fewer consecutive amino acids of a nematode major sperm protein, wherein the domain is capable of stimulating a female sexual maturation.

5 35. The major sperm protein domain of Claim 34, wherein the polypeptide includes 20 or fewer amino acids of the nematode major sperm protein, wherein the domain is capable of stimulating the female sexual maturation.

36. The major sperm protein domain of Claim 34, wherein the polypeptide includes 10 to 30 amino acids of the nematode major sperm protein, wherein the domain is capable of stimulating the female sexual maturation.

37. An isolated nematode major sperm protein domain, comprising: a polypeptide including 125 or fewer consecutive amino acids as set forth in SEQ ID NO:2 or nematode major sperm protein alignment variants thereof, wherein the domain is capable of stimulating a female sexual maturation.

38. The major sperm protein domain of Claim 37, wherein the polypeptide includes 20 or fewer amino acids, wherein the domain is capable of stimulating a female sexual maturation.

39. The major sperm protein domain of Claim 37, wherein the polypeptide includes 10 to 30 amino acids, wherein the domain is capable of stimulating a female sexual maturation.



40. An antibody that selectively binds to a biologically active domain of a nematode major sperm protein, wherein the biologically active domain comprises a sheath cell contraction domain.
41. The antibody of claim 40, wherein the biologically active domain comprises 20 or fewer amino acids of a carboxyl-terminus of the domain.
42. An antibody that selectively binds to a biologically active domain of a nematode major sperm protein, wherein the biologically active domain comprises an oocyte maturation domain.
43. The antibody of claim 42, wherein the biologically active domain includes an amino acid sequence having a group of consecutive residues in the range of 96-110 of SEQ ID NO:2, or nematode major sperm protein alignment variants thereof; and wherein the amino acid sequence includes 20 or fewer consecutive residues of SEQ ID NO:2, or nematode major sperm protein alignment variants thereof.
44. The antibody of claim 42, wherein the biologically active domain includes an amino acid sequence having a group of consecutive residues in the range of 1-106 of SEQ ID NO:2, or nematode major sperm protein alignment variants thereof; and wherein the amino acid sequence includes 20 or fewer consecutive residues of SEQ ID NO:2, or nematode major sperm protein alignment variants thereof.
45. A process of making an antibody, comprising immunizing a non-human animal with an immunogenic fragment of a nematode major sperm protein domain including a polypeptide having 20 or fewer consecutive amino acids

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as set forth in SEQ ID NO:2 or nematode major sperm protein alignment  
variants thereof, wherein the domain is capable of stimulating a female  
sexual maturation.

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